

# Klamath National Forest

## Best Management Practices

REGION 5

EVALUATION PROGRAM

WATER QUALITY

MONITORING REPORT

2011 Fiscal Year

Evaluation of Forest Service administered projects including timber sales, roads, grazing, recreation sites, fuels reduction, in-channel construction and road decommissioning.

February 2, 2012

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## **KLAMATH NATIONAL FOREST**

**2011**

### **BEST MANAGEMENT PRACTICES (BMP)**

#### **SUMMARY**

Fiscal year 2011 was the twentieth year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest (Forest) and the Forest Service Pacific Southwest Region (Region). This program is designed to evaluate how well the Forest and the Region implement BMPs and how effectively the BMPs control water pollution from National Forest lands. Onsite evaluations have been divided into 29 possible “activity groups” (categories) that look at related management practices. In the 2011 fiscal year, Klamath National Forest staff evaluated timber, engineering, range, recreation, minerals, and restoration projects to determine whether BMPs were implemented and effective. Twenty different protocols were used to evaluate a total of sixty sites. Each protocol is designed to measure implementation and effectiveness of an activity category that includes from one to six related BMPs. Appendix A is a table that cross-walks each protocol/activity category alpha-numeric code with its name and the BMPs it is designed to monitor.

The Forest’s BMPEP is composed of two sampling strategies. The first is the evaluation of randomly sampled sites, where data are collected and entered into a Regional database. The second strategy is non-random monitoring, in which sites are selected based on management interest in specific ongoing projects. These sites are often evaluated concurrently (“real time”) and can be qualitative as well as quantitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment; however, the in-channel construction protocol requires at least one sample per site to be done during the active project phase. The site evaluations followed protocols described in Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User’s Guide (USDA, Forest Service, 2002). The random samples were selected from a pool of eligible sites. In cases where the sample pool is very small, either all eligible sites are evaluated, or selection is done in a way that does not bias which sites are selected. The results of the random and non-random evaluations are summarized here.

Randomly sampled sites: In 2011, 60 sites were randomly drawn and evaluated from Forest activity pools and each was reviewed for BMP implementation and effectiveness. Timber (20 sites), prescribed fire and fuels (6 sites), road and engineering (26 sites), recreation (3 sites), grazing (4 sites), and mining operations (1 sites) activities were evaluated. Sites were located on all Ranger Districts (Oak Knoll, Happy Camp, Salmon River, Scott River, and Goosenest).

BMP Implementation was evaluated to determine whether: (1) we did what we said we were going to do to protect water quality; and (2) project environmental documentation and/or contract/permit language was sufficient to ensure water quality protection. BMP effectiveness was evaluated to determine if water quality protection measures met objectives. The objective for meeting most

evaluation criteria is keeping all sediment out of channels and near-channel areas. Sediment deposition presence, volume and proximity to the nearest watercourse were used to indicate level of effectiveness.

In 2011 BMPs were fully implemented at 85% of the sites evaluated and fully effective at 92% of the sites evaluated. Seven percent of the implementation evaluations fell into the “minor departure” category and eight percent failed implementation. Three percent of the effectiveness ratings fell into the “at-risk” category and five percent failed effectiveness. Table 1 summarizes the results of the BMP Random Site Evaluation Program for 1992 through 2011.

Table 1. BMP Random Site Evaluation Program from 1992 through 2011

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		% Rated Minor departure*	% Rated Fully Successful	% Rated At-risk*	% Rated Fully Successful
1992	53	N/A	55%	N/A	81%
1993	77	N/A	79%	N/A	94%
1994	52	N/A	75%	N/A	89%
1995	77	N/A	83%	N/A	96%
1996	57	N/A	84%	N/A	98%
1997	60	N/A	100%	N/A	98%
1998	54	N/A	65%	N/A	98%
1999	38	N/A	66%	N/A	89%
2000	45	N/A	89%	N/A	96%
2001	64	N/A	88%	N/A	95%
2002	53	N/A	92%	N/A	96%
2003	51	N/A	80%	N/A	90%
2004	53	N/A	94%	N/A	100%

Table 1 Cont'd. BMP Random Site Evaluation Program from 1992 through 2011

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		% Rated Minor departure*	% Rated Fully Successful	% Rated At-risk*	% Rated Fully Successful
2005	48	N/A	96%	N/A	98%
2006	45	N/A	93%	N/A	100%
2007	57	N/A	98%	N/A	96%
2008	50	N/A	78%	N/A	92%
2009	63	N/A	97%	N/A	98%
2010	59	0%	100%	5%	88%
2011	60	7%	85%	3%	92%

\*2010 was the first year the "Minor departure" and "At-risk" categories were added

## 2011 BMP MONITORING REPORT

### Introduction

On-site evaluations are the core of the BMP Evaluation Program. Such evaluations are necessary to meet the requirements of a Management Agency Agreement between the Region and the State of California. There are 29 different evaluation procedures designed to assess a specific practice or set of closely related practices. Though the evaluation criteria vary based on the management activity, the evaluation process is similar amongst activities. The Regional Office annually assigns the type and number of management activities to be evaluated on each Forest. The specific sites for each evaluated management activity are randomly selected from Forest project pools. Statistical analyses are periodically performed from the collective Regional data, and annual reports of Region wide BMP implementation and effectiveness are presented to the State and Regional water boards.

The criteria for sample pool development are regionally standardized by activity type and described in the BMPEP User's Guide (2002). Some minor changes in the forms for E10 (road decommissioning) and G24 (grazing) forms resulted from field protocol testing on the Forest in 2005.

In addition to the random sample sites, projects are selected that are of management interest with regard to timely water quality protection implementation. Evaluation of these non-randomly selected sites is often called “concurrent” BMP monitoring because it is accomplished while the project is actively operating. Feedback is immediate and remedial action can be taken. However, comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter season to test the protection measures. In addition to the BMPEP, contract compliance monitoring is done concurrently, and assesses BMP implementation along with other project resource protection measures.

BMP monitoring strives for an interdisciplinary evaluation of projects and actively involves project proponents and watershed personnel. This interdisciplinary effort provides direct feedback to the project proponent on how well the BMP was implemented and allows for adaptive management on future project designs.

Earth scientists Joe Blanchard, Angie Bell, Greg Laurie, and Nicole Brill range conservationist Stephanie McMorris and District project leaders conducted the 2011 BMP evaluations.

## 2011 PROGRAM OVERVIEW AND METHODS

### Randomly Sampled Site Monitoring

Sixty sites were sampled from within 24 6th field watersheds on the Forest (Table 2). The following is a breakdown of the type of activities sampled on timber, engineering, range, recreation, minerals, grazing, and restoration projects:

Table 2. Summary of 2011 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Sites

Form	Project/Site	Implementation	Effectiveness	6 <sup>th</sup> Field Watershed
T01	Tea Garden unit 27	Pass	Pass	Little North Fork Salmon River
T01	Tea Garden unit 6	Pass	Pass	Little North Fork Salmon River
T01	Westside Roadside Hazard unit 15	Pass	Pass	South Fork Indian Creek
T01	Rattler unit 31B	Pass	Pass	Indian Creek
T02	Rattler unit 31A	Pass	Pass	Indian Creek
T02	Tea Garden unit 27	Fail	Pass	Little North Fork Salmon River
T02	Deep unit 46	Pass	Pass	Tompkins Creek-Scott River

# Klamath National Forest 2011 BMPEP Report

Table 2 Cont'd. Summary of 2011 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Sites

Form	Project/Site	Implementation	Effectiveness	6 <sup>th</sup> Field Watershed
T02	Rattler unit 31B	Pass	Pass	Indian Creek
T02	Tea Garden unit 6	Pass	Pass	Little North Fork Salmon River
T02	Pomeroy unit 3	Pass	Pass	Whaleback-Sheep Rock
T03	Deep unit 9	Pass	Pass	Tompkins Creek-Scott River
T03	Deep unit 13	Pass	Pass	Tompkins Creek-Scott River
T04	Rattler unit 31B	Pass	Pass	Indian Creek
T04	Rattler unit 31A	Pass	Pass	Indian Creek
T04	Tea Garden unit 27	Pass	Pass	Little North Fork Salmon River
T04	Tea Garden unit 6	Pass	Pass	Little North Fork Salmon River
T04	Pomeroy unit 3	Pass	Pass	Whaleback-Sheep Rock
T04	Deep unit 46	Pass	Pass	Tompkins Creek-Scott River
T05	Rattler unit 32	Pass	Pass	Oro Fino Creek-Scott River
T05	Mt Hebron unit 1	Pass	Pass	Prather Creek
E08	Orr Lake Rec. Dev. Project rd. 44N30X	Fail	At Risk	Lower Butte Creek
E08	Little North Fork ERFO rd. 40N51	Pass	Pass	Little North Fork Salmon River
E08	Westside Roadside Hazard rd. 17N16	Pass	Pass	Oak Flat Creek-Klamath River
E08	Westside Roadside Hazard rd. 17N11	Pass	Pass	Lower Indian Creek
E09	Orr Lake Rec. Dev. Project rd. 44N30X	Fail	At Risk	Lower Butte Creek
E09	Little North Fork ERFO rd. 40N51	Pass	Pass	Little North Fork Salmon River
E09	Westside Roadside Hazard rd. 17N16	Pass	Pass	Oak Flat Creek-Klamath River
E09	Westside Roadside Hazard rd. 17N11	Pass	Pass	Lower Indian Creek
E10	40N51.25	Pass	Pass	Olsen Creek-North Fork Salmon River
E10	40N51.30	Pass	Pass	Olsen Creek-North Fork Salmon River
E10	40N51.28	Pass	Pass	Olsen Creek-North Fork Salmon River
E10	44N02.1	Pass	Pass	Badger Basin

# Klamath National Forest 2011 BMPEP Report

Table 2 Cont'd. Summary of 2011 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Sites

Form	Project/Site	Implementation	Effectiveness	6 <sup>th</sup> Field Watershed
E11	Orr Lake Rec. Dev. Project rd. 44N30X	Minor Departure	Pass	Lower Butte Creek
E11	Little North Fork ERFO rd. 40N51	Minor Departure	Pass	Little North Fork Salmon River
E11	Westside Roadside Hazard rd. 17N16	Pass	Pass	Oak Flat Creek-Klamath River
E11	Westside Roadside Hazard rd. 17N11	Pass	Pass	Lower Indian Creek
E13	China-Fish Aquatic Passage ARRA rd. 47N77	Pass	Fail	China Creek-Klamath River
E13	China-Fish Aquatic Passage ARRA rd. 46N03	Fail	Fail	Horse Creek
E14	Tea Garden unit 27	Fail	Fail	Little North Fork Salmon River
E14	Rattler unit 32	Pass	Pass	Oro Fino Creek-Scott River
E16	Rattler rd. 44N18	Pass	Pass	Indian Creek
E16	Tea Garden rd. 40N51	Pass	Pass	Little North Fork Salmon River
E17	Sundail rd. 15N10	Pass	Pass	Lower Elk Creek
E17	Taipan rd. 15N19	Pass	Pass	Swillup Creek-Klamath River
E17	Taipan rd. 15N66	Pass	Pass	Lower Elk Creek
E20	Rattler rd. 44N18	Pass	Pass	Oro Fino Creek-Scott River
R22	Clear Creek	Pass	Pass	Lower Clear Creek
R30	Burnt Camp	Pass	Pass	Shovel Creek
R30	Grouse Cr. Lake Camp	Pass	Pass	Lower East Fork Scott River
G24	Horsethief	Pass	Pass	Upper Little Shasta River
G24	Shelly Meadows	Pass	Pass	Right Hand Fork North Fork Salmon River
G24	Red Rock	Pass	Pass	Canyon Creek
G24	Indian Creek	Pass	Pass	Indian Creek
F25	Ben-Horse Cultural Burn	Pass	Pass	South Fork Indian Creek
F25	Crapo Reforestation	Pass	Pass	Crapo Creek-Salmon River

Table 2 Cont'd. Summary of 2011 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Sites

Form	Project/Site	Implementation	Effectiveness	6 <sup>th</sup> Field Watershed
F25	Happy Oak Slash Rx, China unit	Minor Departure	Pass	Humbug Creek
F25	Happy Oak Slash Rx, Titus unit	Minor Departure	Pass	Titus Creek-Klamath River
V28	Crapo Reforestation unit 424-4	Pass	Pass	Olsen Creek-North Fork Salmon River
V28	Crapo Reforestation unit 423-26	Pass	Pass	Olsen Creek-North Fork Salmon River
M26	Cherry Hill	Pass	Pass	McAdams Creek

## Timber

Timber Activities that were sampled that fell into the following activity groups:

Streamside Management Zones (T01), Skid Trails (T02), Suspended Yarding (T03), and Landings (T04), and Timber Administration (T05). Twenty sites were sampled on four districts. All passed implementation and effectiveness except one skid trail evaluation which failed implementation.

## Engineering

The following activity groups were sampled: Road surfacing, drainage and protection (E08), Stream Crossings (E09), Road Decommissioning (E10), Control of Side cast Materials (E11), In-channel Construction Practices (E13), Temporary Roads (E14), Snow Removal (E17), Water Source Development (E16), and Protection of Roads (E20). A total of 26 engineering sites were evaluated on all five districts with implementation rated as fully successful at 77% of the sites and effectiveness rated as fully successful at 81% of the sites evaluated. Eight percent of the implementation rating fell into the "minor departure" category and 15% failed implementation. Eight percent of the effectiveness ratings fell into the "at-risk" category and 11% failed effectiveness.

## Fire and fuels

Prescribed Fire (F25) and Vegetation Management (V28) were evaluated at six sites on three districts. All were rated as fully successful for implementation and effectiveness with the exception of two prescribed fire evaluations which had minor departures in implementation.

## Range

One Activity Group, Range Management (G24) was evaluated at four separate range allotments on three districts. All prescribed key areas were evaluated as 100% implemented and 100% effective.



## **Recreation**

These two activity groups were evaluated: Developed Recreation (R22) and Dispersed Recreation (R30). A total of 3 sites were sampled on three districts. All recreation sites were evaluated as 100% implemented and 100% effective.

## **Minerals**

One activity group, Mining Operations (M26), was evaluated as implemented and effective.

## **Sample Pool**

Data collection methods are specific for each BMP activity group and are described in the BMPEP User's Guide (USDA, Forest Service, 2002). Data gathered for each BMP are used to answer specific questions on BMP evaluation forms. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) to be evaluated must: 1) be implemented under a NEPA decision; 2) adhere to contract requirements; and 3) have been completed at least one but not more than 3 winters prior to evaluation. In-channel construction BMP evaluations (E-13) are conducted during the activity and immediately after completion.

The timber, silvicultural and engineering project sample pools were developed from a list of timber sales logged the previous year. Decommissioned road samples were taken from the Forest-wide Decommissioned Roads Database. The prescribed fire sample pool was developed from a list of completed prescribed fire projects. The recreation sample pool included all known developed and dispersed recreation sites on the Forest. The grazing sample pool was a list of active grazing allotments on the Forest.

## **Non-Randomly Sampled Site ("Concurrent") Monitoring**

Data collection was similar to that used for randomly sampled sites; however, some data may be more qualitative than those collected using the strict Regional protocol. Often the same forms are used. Data are stored in a Forest database but are not entered into the regional database or numerically scored. Narrative reports often present or supplement the evaluation.

## **SUMMARY OF RANDOM SAMPLING RESULTS BY ACTIVITY GROUP**

### **Timber Activities**

#### **T01 Streamside Management Zones (4 sites)**

Tea Garden unit 27, Salmon River District- Implemented/Effective: The road to unit 27 is blocked with a rock pile but an unauthorized vehicle was able to navigate around the rock pile to access the unit. The access road was driven when the condition was wet creating 2-3 inches of ruts. No BMPs were applied on the access road containing native material. There was no evidence of sediment delivery to the stream

channel. The north side of the unit that slopes away from the stream channel allows the stream buffer to be less than 150' from the channel.

Tea Garden unit 6, Salmon River District- Implemented/Effective: There is a 150 foot buffer between Unit 6 and Specimen Creek. A staging area was built outside the unit and within 90 feet of Specimen Creek. There is no evidence of mechanical equipment in the staging area. The area was cleared of brush and piled on top of an abandoned platform. There is no evidence of sediment delivery from the unit or the staging area to the creek. The site does not appear to be a risk to water quality.

Westside Roadside Hazard unit 15, Happy Camp District- Implemented/Effective: The Decision Memo report used 170' buffer for non-anadromous fish bearing stream-Clausen Creek. Riparian reserve (RR) trees that are a public hazard were cut but they were allowed to be left within RR. There is no evidence of sediment delivery to the stream channel and the ground is 100% covered. Canopy cover was measured at 91% within the unit using a solar pathfinder.

Rattler unit 31B, Scott River District- Implemented/Effective: The Watershed Specialist Report did not specified Riparian Reserve buffer width. It may be on other reports but it could not be found. There was no evidence of mechanical equipment within streamside management zone (SMZ) or sediment transport. Ground cover was 100%. Canopy between the units was approx. 88% which was the same above and below the units.

#### **T02 Skid Trails (6 sites)**

Rattler unit 31A, Scott River District- Implemented/Effective: Monitored waterbars were 100% effective for Rattler Timber Sale Unit 31A. There was slight rutting, mostly less than 5cm deep in many skid trails and slight to moderate compaction. There was no evidence of surface erosion in the unit. Overall, the detrimental soil disturbance from skid trails and landings was 8% of the total unit.

Tea Garden unit 27, Salmon River District- Not Implemented/Effective: Five out of nine, or 56% of waterbars in Unit 27 of the Tea Garden Timber Sale were rated as not implemented. In some instances, this was due to improper design and construction, other waterbars failed because they were driven over and destroyed by vehicles in the unit. Failure due to improper design and construction included waterbars that were too short and did not direct the flow of water off the skid trails, waterbars that were build perpendicular to the skid trail that created dams instead of diverting water, and waterbars that directed flow from one skid trail to an adjacent skid trail. The Timber Sale Administrator on the sale said that the District re-opened a temporary road after the sale was closed to allow wood-cutting. This may have resulted vehicles driving over waterbars. Waterbars were installed or repaired by District staff before the next storm event.

Deep unit 46, Scott River District- Implemented/Effective: Monitored waterbars were 100% effective for Deep Timber Sale Unit 46. Some rutting was present in the unit, especially where the skidding equipment turned on a side-slope. There was very little erosion on any of the waterbars and no sediment transported to the SMZ.

Rattler unit 31B, Scott River District- Implemented/Effective: Monitored waterbars were 92% effective for Rattler Timber Sale Unit 31B. The failed waterbar diverted flow from on skid trail to an adjacent skid trail. The result was only slight surface erosion on the skid trail. There was no evidence of erosion elsewhere in the unit and no sediment delivered to stream channels. There was slight rutting, mostly less than 5cm deep in many skid trails and slight to moderate compaction. Overall, the detrimental soil disturbance from skid trails and landings was 8% of the total unit.

Tea Garden unit 6, Salmon River District- Implemented/Effective: Two out of eleven, or 18% of waterbars in Unit 6 of the Tea Garden Timber Sale were rated as ineffective. The two failures resulted from a waterbar that was built perpendicular to the skid trail and therefore did not divert water off of the skid trail, or a waterbar that was built on a skid trail in a concave feature that did not allow flow to drain off of the skid trail. Very minor erosion resulted from these failures and no sediment was transported to the SMZ

Pomeroy unit 3, Goosenest District- Implemented/Effective: Pomeroy Unit 3 had slopes less than 5%, so waterbars were not needed for erosion. Nearly all skid trails were covered with needle cast. There was no evidence of erosion on any skid trails. There were no streamside management zones (SMZs) in the unit.

### **T03 Suspended Yarding (2 sites)**

Deep unit 9 and 13, Scott River District- Implemented/Effective: Neither cable units had SMZs. Skyline corridors were water-barred and or covered with slash to prevent concentrating water. After one winter, all erosion control measures were effective and ground cover objectives were met.

### **T04 Landings (6 sites)**

Rattler unit 31B, Scott River District- Implemented/Effective: Monitored landings on Rattler TS Unit 31B passed implementation and effectiveness criteria. One landing was outsloped to drain into an inboard-ditch. There was slight rilling (less than 10% of the surface area) on the fillslope, and less than 1 cubic yard of material moved. There was no sediment transported to a stream channel.

Rattler unit 31A, Scott River District- Implemented/Effective: Monitored landings on Rattler TS Unit 31A passed implementation and effectiveness criteria. One landing was outsloped to drain into an inboard-ditch with a culvert 10ft away. There were no features preventing water from draining directly from the landing into the culvert, but soil cover on the landing was sufficient to prevent surface erosion. The culvert was not directly connected to a stream channel; there was a 100ft buffer where sediment would be deposited if a rain event caused surface erosion on the landing.

Tea Garden unit 27, Salmon River District- Implemented/Effective: Monitored landings on Tea Garden Timber Sale Unit 27 had slight drainage and surface erosion problems. Flow from a temporary road upslope from the landing was not diverted before reaching the landing, causing rilling on less than 10% of the area. Water flow off of the landing was diverted away from skid trails with waterbars. There was no evidence of sediment transport to the SMZ.

Tea Garden unit 6, Salmon River District- Implemented/Effective: Monitored landings on Deep Timber Sale Unit 46 were out-sloped to drain water away from the roadway. There was no evidence of sediment transport to the SMZ.

Pomeroy unit 3, Goosenest Ranger District- Implemented/Effective: Pomeroy Unit 3 had large, up to 1 acre, nearly flat landings. There was no evidence of puddling water due to compaction. There was no evidence of erosion and no SMZs in this unit.

Deep unit 46, Scott River District- Implemented/Effective: Monitored landings on Deep Timber Sale Unit 46 were out-sloped to drain water away from the roadway. There was no evidence of sediment transport to the SMZ.

#### **T05 Timber Sale Administration (2 sites)**

Rattler unit 32, Scott River District- Implemented/Effective: The timber sale administrator had the purchaser correct the angle of the waterbars in the unit after inspection revealed that some were constructed improperly. The reconstructed waterbars were effective in controlling erosion on the skid trails.

Mt Hebron unit 1, Goosenest Ranger District- Implemented/Effective: The BMP wet weather operations (WWO) Seasonal Report indicates that the soil was not adequately dry to 4" depth to allow tractor skidding in unit 1. The Report states that two weeks later the site had dried enough to allow operations to continue. Upon evaluation of the unit, it was noted that timely closure prevented rutting or puddling.

#### **Road and Engineering Activities**

##### **E08 Road Surface & Slope Protection (4 sites)**

Orr Lake Rec. Dev. Project rd. 44N30X, Goosenest Ranger District- Not Implemented/At risk: The fill slope was required to be hydro seeded but there is no evidence that it was done. There were minor rills on the fillslope and several slope failures > 5 cubic yards but they did not extend beyond the toe slope. The slope did not have adequate slope protection or vegetative cover.

Little North Fork ERFO rd. 40N51, Salmon River District- Implemented/Effective: The project was completed in 2009. The culvert is plugged with sediment by 70% but still effective in diverting water.

Westside Roadside Hazard rd. 17N16, Happy Camp District- Implemented/Effective: Westside Roadside Hazard rd. 17N11, Happy Camp District- Implemented/Effective: The evaluation was done during heavy rain. 120 ft of rill was observed on the road surface and does not appear to be a problem.

##### **E09 Stream Crossings (4 sites)**

Orr Lake Rec. Dev. Project rd. 44N30X, Goosenest Ranger District- Not Implemented/At risk: The existing road was relocated from the lower slope to the upper slope, out of the riparian area to minimize impact to water quality in the lake. The fill slope lacking vegetation cover was required to be hydro seeded but

there is no evidence that it was done. There were minor rills on the fillslope and several slope failures > 5 cubic yards but they did not reach the lake.



Figures 1a and 1b. Poor slope stabilization in Orr Lake Rec. Dev. Project

Little North Fork ERFO rd. 40N51, Salmon River District- Implemented/Effective: The culvert in a perennial channel is plugged with sediment by 70% but still effective in diverting water.



Figure 2a. Little North Fork ERFO rd. 40N51 inlet 70% plugged



Figure 2b. Little North Fork ERFO rd. 40N51 culvert outlet

Westside Roadside Hazard rd. 17N16, Happy Camp District- Implemented/Effective

Westside Roadside Hazard rd. 17N11, Happy Camp District- Implemented/Effective

### **E10 Road Decommissioning (4 sites)**

40N51.25, 40N51.30, 40N51.28, Salmon River District- Implemented/Effective: The roads had minimal earthwork completed during the decommissioning processes. They are on the top 1/3 of the ridge and cross only small swales. The crossings have small fills and do not have culverts. The crossings in the swales were not removed but there was no evidence of surface water (annual scour) in the features at the time of field review. The roads are steep (20-25%) and were outsloped in places (5-8%). The roads had no ditches along them. The roads consistently had nearly 80% soil cover which ranged from almost all rock to grass and needle cast. There was no evidence of rilling on any of the roadbeds/cuts or fills. There was no evidence of slope instability along the roads at the time of the visit. The road is not blocked or bermed and no attempt to obliterate the take off for 40N51.28 or 40N51.30 was made from the bottom of the main 40N51 road. The takeoff from the saddle was well hidden, however. There was evidence of occasional use of the lower portion of 40N51.28 mainly to access a large landing near the 40N51 road. It looks as if the landing is used as a dispersed camp area. There was no evidence of use above the landing or along 40N51.30.

44N02.1, Goosenest District- Implemented/Effective: There is a berm at the take off of the road. The road shows no sign of motorized use. The road has been ripped and vegetation is growing in the roadbed. The road is completely obliterated in the meadow and at the stream crossing. The stream in a relict channel most likely from glacial outburst during the Pleistocene. The channel shows no sign of annual scour and is oversized for the amount of runoff the drainage could provide.

### **E11 Control of Sidecast Material (4 sites)**

Orr Lake Rec. Dev. Project rd. 44N30X Goosenest District- Minor Departure/Effective: The plan did not specify disposal of sidecast material but the project leader stated that the road width was marked on the cutslope and fillslope showing the width of the planned road according to the design plan.

Little North Fork ERFO rd. 40N51, Salmon River District- Minor Departure/Effective: The design plan/EA did not include limits of sidecast material and disposal area.

Westside Roadside Hazard rd. 17N16, Happy Camp District- Implemented/Effective

Westside Roadside Hazard rd. 17N11, Happy Camp District- Implemented/Effective

### **E13 In-channel Construction Practices (2 sites)**

China-Fish Aquatic Passage ARRA rd. 47N77, Happy Camp District- Not Implemented/Not Effective: The old culvert restricted fish passage and it was replaced with a bottomless arch culvert designed to allow for natural stream bottom and to handle 100 year storm event. The purpose of the project was to minimize maintenance and sediment delivery. This project was completed in 2010 with the designed channel morphology being flat-bedded with small homogeneous gravel. The decision memo for Klamath Fish Passage Sites required that the fill material be excavated (approx. 550 ft<sup>3</sup>) to the depth of the original channel gradient and to the width of the canyon wall and/or floodplain at the base. Post-winter evaluation showed that the debris deposit was not excavated to the original channel depth, instead the



stream channel is incising with a 6 foot steep eroding bank. The downcut is 35ft upstream from the culvert inlet. Engineers plan to repair the site by farther excavating the debris deposit and push the width back against the canyon wall. This site requires a post-op evaluation in 2012 when the reconstruction is complete.



Figure 3. Down cut of fill material upstream of China-Fish Aquatic Passage culvert on rd. 47N77

China-Fish Aquatic Passage ARRA rd. 46N03, Oak Knoll District- Implemented/Not Effective: This project was completed in 2003. The old culvert restricted fish passage and it was replaced with a bottomless arch culvert designed to allow for natural stream bottom and to handle 100 year storm event. The purpose of the project was to minimize maintenance and sediment delivery. The stream is flowing as it was designed to do so. No problems were noticed at this site. Some coir logs remained as permanent BMPs.

As for the not effective ratings for both E13 sites, sediment from the construction phase was deposited on the substrate (see 2010 annual BMPEP report).

#### **E14 Temporary Roads (2 sites)**

Tea Garden unit 27, Salmon River District- Not Implemented/Not Effective: The temporary road was graded and outsloped after logging operations and before the sale was closed but not blocked or waterbarred as specified in the environmental assessment (EA). The road was then re-opened by the District to allow woodcutter access to the slash pile at the landing. The granitic native surface road was used during wet weather causing rutting on the road, which concentrated flow down its length due to a lack of waterbars. The soil eroded from the road was deposited on the landing and no sediment reached the SMZ. District staff was alerted of the BMP failure and corrected the problem by blocking access to the temporary road with a large berm and installing waterbars.



Figure 4a. Tea Garden unit 27 temporary road before waterbar installation



Figure 4b. Tea Garden unit 27 temporary road after waterbar installation

Rattler unit 32, Scott River District- Implemented/Effective: The take off of the road from 44N18 was obliterated and in fact was difficult to find. The road followed a small ridge along a ephemeral stream. The roadbed was effectively waterbarred with the water being directed away from the channel. The area showed signs of recovery with grasses and forbs growing on the disturbed area.

#### **E16 Water Source Development (2 sites)**

Rattler rd. 44N18, Scott River District- Implemented/Effective: The water source identified on the Rattler timber sale area map is located on private property. No sediment problems were noted.

Tea Garden rd. 40N51, Salmon River District- Implemented/Effective: The water source was recently improved when the adjacent culvert and stream crossing were upgraded. Gravel was placed on the approach to the water source to prevent sediment from entering the pool. There was no discernable difference in channel substrate or morphology below the water source.



**E17 Snow Removal (3 sites)**

Sundail rd. 15N10, Happy Camp District- Implemented/Effective

Taipan rd. 15N19, Happy Camp District- Implemented/Effective

Taipan rd. 15N66, Happy Camp District- Implemented/Effective

No problems were noted at these three sites containing a stream crossing. There was very minor rilling or rutting on the road surface and no fillslope erosion.

**E20 Management of Roads during Wet Periods (1 site)**

Rattler rd. 44N18, Scott River District- Implemented/Effective: Road 44N18 was used at the beginning of the wet weather operating period, before significant storm events. The BMP WWO Seasonal Report indicates that the road was subsequently bladed post-haul. The field review of the road found no evidence of rill, rutting, or sediment delivery to stream channels.

**Recreation Activities**

**R22 Developed Recreation Sites (1 site)**

Clear Creek, Happy Camp District- Implemented/Effective: Some trash occurred near the vault toilet and established fire rings. No sedimentation was observed entering the creek.

**R30 Dispersed Recreation Sites (2 sites)**

Burnt Camp, Goosenest Ranger District- Implemented/Effective: No problem was noticed relating to recreational use. However, 4 burned piles from the fuel treatment in 2010 were placed in the meadow. The stream is flowing through one of the piles.

Grouse Cr. Lake Camp, Scott River District- Implemented/Effective: The trail along the creek was inspected for any trash, human waste, and ground cover. No sedimentation was observed entering the creek.

**Grazing**

**G24 Range Management (4 sites)**

Horsethief, Goosenest District- Implemented/Effective: There was very little use of the streamside zone as evidenced by light herbaceous utilization. Trampling was evident due to saturated soils on less than 10% of the evaluated reach. Due to a high level of soil cover, the trampling did not deliver sediment into the channel. Bank stability was not impacted because trampling occurred a few feet away from the stream bank.



Figure 5. Tramping near stream in the Horsethief grazing allotment

Shelly Meadows, Salmon River District- Implemented/Effective: The channel evaluated is deep, narrow, and dominated by *Carex* and *Juncas* species. Livestock alteration does not seem to be affecting streambank stability or stream shape as there are no observed cattle crossings due to the fact that cattle can easily step over the stream. Root masses are well established on the reach but streambanks are erodible due to the shallow granitic soils. Few woody species grow in the meadow. Shade is provided mainly from the herbaceous vegetation and overhanging stream banks. In addition, a few trees at the edge of the meadow are tall enough to shade the stream reach. Average shade along the stream was 19%. Implementation standards and guidelines were met and all effectiveness criteria were in the highest category.



Figure 6. Shelly Meadow allotment showing no signs of stream bank instability

Red Rock, Scott River District- Implemented/Effective: The monitoring site that was evaluated has a sloped moist meadow on one side of the creek and then a small wet meadow on the other side of the creek. The reach is lined with a diverse community of sedges, forbs, woody species and rocks, which provide stability to streambanks. The streambanks were covered with vegetation other than at three locations where cattle crossings occur. Some localized stream widening was observed due to trampling from both domestic and wild animals. No visible erosion is occurring on the meadow above the creek but there are many gopher mounds in the drier sections. Shade (average of 54%) is provided by tall conifers, willows, and alder shrubs. Implementation standards and guidelines were met and all effectiveness criteria were in the highest category.





Figure 7. Red Rock allotment

Indian Creek, Scott River District- Implemented/Effective: The monitoring site that was evaluated met the highest standard for effectiveness in all categories except for riparian herbaceous vegetation. Along the stream bank 30-50% of herbaceous vegetation was composed of mid to late seral stage with root masses capable of withstanding annual runoff flows. This was a minor departure in standards and did not impact water quality.



Figure 8. Indian creek allotment

### **Fire and Fuels Activities**

#### **F25 Prescribed Fire (4 sites)**

Ben-Horse Cultural Burn, Happy Camp District- Implemented/Effective: Baldy Unit was burned in October 2010 as part of a cultural burn to encourage new grass and brush regrowth and reintroduce fire into the environment to restore historic fire conditions. Low fire intensity and patchy fuels combined for a very light burn across most of the unit. In the areas that were burned, soil cover averaged 94%, which meet the objectives in the burn plan. A total of 42% of the unit remained unburned. Less than 10% of the riparian area was burned and backing fires kept the burn light. There was no evidence of hydrophobic soils, rilling, or sediment delivered to the nearby stream channel. The canopy cover directly affecting the stream was not impacted by the prescribed burn.

Crapo Reforestation, Salmon River District- Implemented/Effective: Crapo Reforestation Unit 424-49 was burned in wildfires in 1977, 1987, and 2008. Fuels in the unit were treated with lop and scatter followed by broadcast burn in October 2010. Ground cover averaged 58% across the unit, which is within 90% of the objective. The soils are very rocky, with 25-50% of the ground cover comprised of surface rocks. Resprouting shrubs and hardwood trees, grasses, and unburned fuels make up the rest of the soil cover. The objectives in the riparian reserve were met with low severity backing fire and a buffer of 30 to 50 ft was left between the burn and the stream. There was no evidence of hydrophobic

soils, rilling, or sediment delivered to the nearby stream channel. The canopy cover directly affecting the stream was not impacted by the prescribed burn.

Happy Oak Slash Rx, China unit, Oak Knoll District- Minor Departure/Effective: China Unit 1 was burned in a wildfire in 2007, then slashed in 2008 and broadcast burned in October 2010 for preparation for conifer planting. The ground cover averaged 70% across the unit, which meets LRMP standards for the soil type and slope steepness. The fire burned hottest up the draws and in areas of dense slash, while the ridges and areas with shallow rocky soils were burned lightly or not at all. New ground cover consisting of grass and herbs cover 25-50% of the unit. There was no evidence of hydrophobic soils, rilling, or sediment delivered to the nearby stream channel. A buffer of approximately 150-200ft was left between the burn and the stream. The canopy cover directly affecting the stream was not impacted by the prescribed burn. Upon review of the burn plan, soil and water considerations were not mentioned.

Happy Oak Slash Rx, Titus unit, Happy Camp District- Minor Departure/Effective: Titus Unit 2 was burned in the 2006 Titus Wildfire, and then slashed and broadcast burned in January 2010 for preparation for conifer planting. The ground cover averaged 82% across the unit, which meets LRMP standards for the soil type and slope steepness. The fire burned hot in the majority of the unit and almost all fuels were consumed. There was very fast response from ferns, grasses, and re-sprouting shrubs following the fire. There was no evidence of hydrophobic soils, rilling, or sediment delivered to the nearby stream channel. A draw is present in the lower section of the unit but does not have show any evidence that flows at any time of the year. Upon review of the burn plan, soil and water considerations were not mentioned.

#### **V28 Vegetation Manipulation (2 sites)**

Crapo Reforestation unit 424-4, Salmon River District- Implemented/Effective: Unit 423-4 was masticated to prepare the site for tree planting. Due to the soft granitic soils, rutting was present where the mastication equipment turned on the hill slope. The rutting was limited to less than 1 rut per 20' of transect and did not cause sediment delivery to the stream channel.

Crapo Reforestation unit 423-26, Salmon River District- Implemented/Effective: Unit 423-26 was masticated to prepare the site for tree planting. A section of the unit with steep inner gorges was not masticated and instead was hand piled and burned. The stream course was adequately buffered from ground-based mastication equipment to prevent sediment delivery.

#### **Mining**

##### **M26 Mining Operations (1 site)**

Cherry Hill, Scott River District- Implemented/Effective: The Cherry Hill mine is sited away from any stream channels. The access road is on a ridge and had no drainage issues. There were no areas of concentrated flow or evidence of sediment delivery to any stream channels. There was no evidence of inappropriately stored hazardous materials that may lead to water contamination on the site.



## SUMMARY OF NON-RANDOM SITE EVALUATIONS

Several sites were selected for concurrent monitoring because the activities and their proximity to watercourses pose a potentially high risk for sediment discharge. The results of non-randomly selected evaluations are presented in table 3.

Table 3. Summary of 2011 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Non-Randomly sampled sites

Form	Project/Site	Implementation	Effectiveness	6 <sup>th</sup> Field Watershed
T01	Crapo Creek Reforestation, unit 423-6	Pass	Pass	Olsen Creek-North Fork Salmon River
E17	Crapo Creek Reforestation, rd 40N51	Pass	Pass	Crapo Creek-Salmon River
E20	Crapo Creek Reforestation, rd 40N51	Pass	At Risk	Olsen Creek-North Fork Salmon River
E08	Scott River Rd Sediment Source, rd 44N41 (lower)	Pass	At Risk	Tompkins Creek-Scott River
E13	Scott River Rd Sediment Source, rd 44N41 (lower)	Pass	Pass	Tompkins Creek-Scott River
E08	Scott River Rd Sediment Source, rd 44N41 (upper)	Pass	Pass	Tompkins Creek-Scott River
E13	Scott River Rd Sediment Source, rd 44N41 (upper)	Pass	Pass	Tompkins Creek-Scott River
E08	Scott River Rd Sediment Source, rd 45N65	Pass	Pass	Tompkins Creek-Scott River
E13	Scott River Rd Sediment Source, rd 45N65	Pass	Pass	Tompkins Creek-Scott River
R22	Mule Bridge Corrals	Pass	Pass	Yellow Dog Creek-North Fork Salmon River

### Crapo Creek Site Prep and Reforestation Project

The project treatment includes 697 acres of fuel treatment and 1296 acres of planting. Treatment included pile burning, slash and broadcast burning, and mastication. The BMPEP evaluations for E12 (Servicing and Refueling), E16 (Water Source Development), T02 (Skid Trails), T06 (Special Erosion Control and Revegetation), and T07 (Meadow Protection) were not completed for this project as

indicated because there were no skid trails or landings, no meadow within the project area, water was not drafted from any of the creeks, and the Burn Plan did not cover servicing and refueling on site.

**T01:** Unit 423-6, Pollocks Gulch - Implemented/Effective

**E17:** Road 40N51 Implemented/ Effective

**E20:** Road 40N51 – Implemented/At Risk: 400' of rills are present on the road surface. Rills began on the road surface and continued from one side of the road to the other side but because the road surface is outsloped alternating and the berm is higher than the road surface, it continues until it reached the stream crossing where it left the road surface onto a fillslope entering the SMZ but it did not enter the stream channel.

#### **Scott River Road Sediment Source Reduction: Lower Scott**

The project's goal is to reduce sediment delivery and to enhance habitat for salmonids and other aquatic species. Roads were reconstructed to reduce drainage size and runoff, erosions were repaired and undersized culverts were replaced with larger culverts to withstand 100 year storm event.

Buker Road - 44N41, Milepost 1.82 (lower segment).

**E08:** Implemented/ At risk: The rock buttress is stable despite having lost some rock material when they entered the SMZ. The road surface next to the rock buttress is cracked which may have contributed to minor fillslope failure.

There's a minor deposition of rocks and sediment in the Stream Management Zone from the rock buttress but it did not enter the stream channel. The fillslope is very steep with fine, loose soil. Sensitive site and heavy rain are the possible causes but the effect to water quality is minor.

**E13:** Implemented/Effective

Buker Road 44N41, Milepost 1.90 (upper segment).

At the stream crossing, the road is outsloped and minor rills on the fillslope indicated that the surface runoff is effective. At the retaining wall, there are several cracks on the road surface. The cracks may or may not have shifted the wall. Both edges of the retaining wall appear to be unstable. One side of the retaining wall has a failed fillslope where four large boulders came loose and rolled down the slope until they came to a rest at the bottom road. The other side of the retaining wall appears to be unstable with soil coming loose from underneath the concrete block exposing the fabric. Across the road from the retaining wall is the failed cutslope (< 5 ft3) where sediment filled the inboard ditch but this slope appears to be covered with approximately 60% grass. There's little potential for diversion because of the short flat road prism.

**E08:** Implemented/Effective

**E13:** Implemented/Effective



East Tomkins Road – 45N56, Milepost 0.73.

Above the stream crossing is a forested wetland because the old culvert was undersized creating channel aggradation. The new culvert will soon allow mobilization of upstream deposit and the channel will eventually reestablish itself. Below the culvert, there is a lack of vegetation cover and the rocks are 6"-14" with no fine sediment or gravel. This would take years before vegetation could take hold and provide stream shading.

**E08:** Implemented/Effective

**E13:** Implemented/Effective

The slope is very steep and imported rock material may have rolled farther down the fillslope and channel than necessary. The effect to water quality is minor because the stream is flowing subsurface. The only major effect would be lack of stream shading. The site lacked fine sediment and gravel; it would take a long time before vegetation could take hold below the culvert outlet. The abandoned materials are the broken pieces of concrete-fabric revetment and metal strips that were used at the old culvert. There is no effect to water quality.

#### **Mule Bridge Corrals**

**R22:** Implemented/ Effective: Drainage from corrals slopes away from the Salmon River and into a swale on the west side. Runoff is effectively re-infiltrated in the swale. Any nutrients or fecal coliform is disconnected from the river and is not a source of water contamination.

#### **2011 Wet Weather Operations**

**T05/E20:** Selected WWO notes from timber sale administrators have been compiled and attached as Appendix B. These notes evaluated features such as roads, skid trails, water holes, and cable corridors during periods of wet or snowy conditions. Problems leading to BMP failures were identified and corrected. Resource staff was contacted when necessary to determine if BMPs were being met.

#### **ADAPTIVE MANAGEMENT DISCUSSION**

##### **1. Practices that are working well**

Most of the 20 activities evaluated in 2011 met BMP compliance and were effective at controlling nonpoint pollution. These included most timber sale activities; minerals management activities, fire and fuels activities, range management, and recreation sites. For these activities, Best Management Practices do not need modifications and should continue as currently implemented for future projects.

A sound adaptive management strategy was demonstrated when the failures that were documented on the Tea Garden Project were corrected. The field review of the project revealed implementation problems with skid trails and temporary roads caused by wood cutters accessing the unit during wet

weather conditions. This problem was discussed with the timber sale administrator, the district roads manager, as well as the district timber staff. The resolution was a commitment to improve communication between watershed staff, district timber, and roads staff to ensure that road closures are enforced especially during the wet weather season. In addition, the immediate problem of a lack of water bars on the temporary road and skid trails was fixed before the next storm event.

## 2. Practice applications that can be improved

The Forest is continuing the process of refining engineering activities to meet BMP standards. The problem areas that were identified in the Klamath National Forest 2010 BMPEP report showed moderate improvements in 2011, though some failures still occurred. Road surface and slope protection (E08), stream crossing (E09), control of side cast material (E11), and in-channel construction practices (E13) are all areas that need more work to achieve more consistent BMP compliance. In cases where water quality has a potential to negatively impacted, corrective actions have been taken and follow-up monitoring will be conducted in 2012 (Table 4).

Table 4. Corrective Actions Taken and Follow-up Monitoring for 2012 BMPEP Report

Form	Project/Site	Corrective Actions Taken in 2011	Notes for 2012 Evaluations
T02	Tea Garden unit 27	Waterbars rebuilt	Check condition of rebuilt waterbars
E08	Orr Lake Rec. Dev. Project rd. 44N30X	None, natural vegetation of fillslope will occur	Check for rills and failures on fill slope
E09	Orr Lake Rec. Dev. Project rd. 44N30X	None, natural vegetation of fillslope will occur	Check level of cover on fill slope, as well as rilling and slope failures
E13	China-Fish Aquatic Passage ARRA rd. 47N77	Debris deposit excavated to original channel width and depth	Check the excavation of debris deposit to see if cleared to original channel depth and width as described. Check downstream for evidence of sedimentation of channel riffle substrate
E13	China-Fish Aquatic Passage ARRA rd. 46N03	None, no problems with design and construction of stream crossing were noted	Check downstream for evidence of sedimentation of channel riffle substrate
E14	Tea Garden unit 27	Barrier placed to block road and waterbars built	Check if barrier is effective in keeping trucks off of temp road. Check effectiveness of waterbars

### E08 Road Surface and Slope Protection and E09 Stream Crossing

One out of four projects had implementation problems that caused BMP failures for both road surface and slope protection and stream crossing. The fill slope for the Orr Lake Recreation Development Project was required to be hydro seeded but there was no evidence that it was done. There were minor rills on the fillslope and several slope failures of > 5 cubic yards but they did not extend beyond the toe slope and did not reach the lake. The failure to apply hydro mulch could be corrected with better oversight to ensure that contract work is carried out as specified in engineering plans.

#### E11 Control of Side-cast material

Two of four evaluations had minor departures in project implementation of control of sidecast material. The Orr Lake Recreation Development Project did not specify disposal of sidecast material but the project leader stated that the road width was marked on the cutslope and fillslope showing the width of the planned road according to the design plan. For the Little North Fork ERFO the design plan/EA did not include limits of sidecast material and disposal area. In these two projects, improved documentation in project plans would have resulted in a fully successful implementation rating.

#### E13 In-Channel Construction

Two in-channel construction sites were reviewed for the post-project stage of BMP evaluations in 2011. Both of these were also reviewed during the active stage of BMP evaluations in 2010, at which time effectiveness failures were noted. The 2010 BMPEP report stated that the effectiveness evaluation for active project was not met for sedimentation of channel riffle substrate at both sites. The cause of the effectiveness failure is due to the fact that the contract was awarded later than expected and the contractor did not complete the project prior to the onset of winter storms.

The evaluation for China-Fish Aquatic Passage ARRA rd. 47N77 was rated as not implemented and not effective in 2011 due to problems in both the active and post-project phase of BMP evaluations. The problems during the active phase are described above. The problems in the post-project phase were due a failure to implementing the design plans that led to stream channel incision. The old culvert restricted fish passage and it was replaced with a bottomless arch culvert designed to allow for natural stream bottom and to handle 100 year storm event. The purpose of the project was to minimize maintenance and sediment delivery. This project was completed in 2010 with the designed channel morphology being flat-bedded with small homogeneous gravel. The decision memo for Klamath Fish Passage Sites required that the fill material be excavated (approx. 550 ft<sup>3</sup>) to the depth of the original channel gradient and to the width of the canyon wall and/or floodplain at the base. Post-winter evaluation showed that the debris deposit was not excavated to the original channel depth, instead the stream channel is incising with a 6 ft steep eroding bank. The downcut is 35 ft upstream from the culvert inlet. Engineers plan to repair the site by farther excavating the debris deposit and push the width back against the canyon wall. This site requires a post-op evaluation in 2012 when the reconstruction is complete.

The evaluation for the China-Fish Aquatic Passage ARRA rd. 46N03 was rated as implemented but not effective in 2011. The not effective rating was due to sediment from the construction was deposited on the substrate during the active phase of construction described above. The post project review revealed that the stream is flowing as it was designed and no problems were noted.

Three non-random E13 evaluations for the Scott River Road Sediment Source Reduction Project were rated as implemented and effective for both active and post project stages. See the Summary of Non-Randomly Selected Evaluations section of this report for details. The successful ratings for this project demonstrate that problems with in-channel construction are isolated.

## **CONCLUSIONS**

The 2011 the BMPEP program showed improvements in effectiveness evaluations compared to 2010, but deficiencies in implementation were noted. The failures occurred mostly in engineering evaluations as a result of either not including stream-course protection measures in plans or not correctly following the stream-course protection measures in plans. The problems identified were brought to the attention of project engineers, timber sale administrators, and district staff and corrective actions were taken as needed to protect water quality.

## **REFERENCES**

USDA, Forest Service, 2002, Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide, USDA, Forest Service, Pacific Southwest Region.

**Appendix A. BMP Evaluation Procedure Names and Descriptions**

<i><b>Procedure #</b></i>	<i><b>Procedure Name (BMPs Monitored)</b></i>
T01	Streamside Management Zones (BMP 1.8, 1.19, 1.22)
T02	Skid trails (BMP 1.10, 1.17)
T03	Suspended yarding (BMP 1.11)
T04	Landings (BMP 1.12, 1.16)
T05	Timber sale administration (BMP 1.13, 1.20, 1.25)
T06	Special erosion control and revegetation (BMP 1.14, 1.15)
T07	Meadow protection (BMP 1.18, 1.22, 5.3)
E08	Road surface, drainage and slope protection (BMP 2.2, 4, 5, 10, 23)
E09	Stream crossings (BMP 2.1)
E10	Road Decommissioning (BMP 2.26)
E11	Control of side cast material (BMP 2.11)
E12	Servicing and refueling (BMP 2.12)
E13	In-channel construction practices (BMP 2.14, 2.15, 2.17)
E14	Temporary roads (BMP 2.16, 2.26)
E15	Rip rap composition (BMP 2.20)
E16	Water source development (BMP 2.21)
E17	Snow removal (BMP 2.25)
E18	Pioneer road construction (BMP 2.3, 2.8, 2.9, 2.19)
E19	Restoration of borrow pits and quarries (BMP 2.27, 2.18)
E20	Management of roads during wet periods (BMP 2.24, 7.7)
R22	Developed recreation sites (BMP 4.3, 4, 5, 6, 9, 10)
R23	Location of stock facilities in wilderness (BMP 4.11)
G24	Range management (BMP 8.1, 8.2, 8.3)
F25	Prescribed fire (BMP 6.3)

**Appendix A Cont'd. BMP Evaluation Procedure Names and Descriptions**

<i><b>Procedure #</b></i>	<i><b>Procedure Name (BMPs Monitored)</b></i>
M26	Mining operations (Locatable minerals) (BMP 3.1, 3.2)
M27	Common variety minerals (BMP 3.3)
V28	Vegetation manipulation (BMP 5.1, 5.2, 5.5, 5.7)
V29	Revegetation of surface disturbed areas (BMP 5.4)
R30	Dispersed Recreation Sites (BMP 4.5, 4.6, 4.10)

## Appendix B. Non-Random BMP Monitoring of 2011 Timber Operations and Management of Roads during Wet Periods

Selected documentation of monitoring from Timber Sale Administrator's BMP – WWO Seasonal Report Tables.

Project (timber sale)	Feature evaluated	Date	BMP status	BMP problem	Fix	Comment/ Corrective action	Resource person contacted
Railroad Multi Product	water hole	9/7/2011	meets	water source	Y	Inspected water hole before operations and made improvements. Purchaser rocked entrance, made drain out hole. Ruts at creek before operations started	engineer
Railroad Multi Product	water bars	9/27/2011	meets			Checked water bars and had some rebuilt	
Railroad Multi Product	roads	9/27/2011	meets			watering the roads	
Horse Heli	roads	1/6/2011	fails	bladed snow off road	Y	Purchaser had bladed snow off roads. Gave copy of wet weather opps guide to field rep. Told rep to leave some snow on roads and to pull back any soil post haul	
Horse Heli	mechanized felling	6/15/2011	meets			No skidding or hauling until roads dry out. Cross ditched roads where water running down road	
Horse Heli	skidding	6/22/2011	meets			Soils have dried enough, small patches of snow remain	
Horse Heli	landings	10/14/2011	meets			No rock placed on landings, slash placed to slow possible erosion	
Shovel	roads	1/3/2011	meets			Operating on 1"-2" of snow packed down. All roads are packed snow and ice	
Shovel	skidding	10/5/2011	meets			2"-3" inches new snow. Skid trails look good, no rutting	
Round sink	skidding	6/23/2011	meets			Weather has been dry, soil is dry for skidding	
Round sink	roads	6/23/2011	meets			Keeping roads watered to abate dust	
Beauty flat	skidding	10/4/2011	meets			Received some major precip overnight. Skidding and feller-buncher operations meet BMP, no rutting	



### Appendix B Cont'd. Non-Random BMP Monitoring of 2011 Timber Operations and Management of Roads during Wet Periods

Project (timber sale)	Feature evaluated	Date	BMP status	BMP problem	Fix	Comment/ Corrective action	Resource person contacted
Beauty flat	haul road	10/4/2011	meets	rutting	Y	Checked haul road after operations. Road was rutted .25 miles close to unit 91. Called purchaser, who came back from Ashland and corrected drainage and rutting problems	
Beauty flat	roads	10/24/2011	meets			Roads have dried and have been bladed. Installing small cross ditches to drain road after operations complete. If no one drive on road after first storm, drainage should improve	
Rattler	mechanized felling	10/9/2009	meets	rutting		Stay to gentler slopes.	hydrologist
Rattler	skidding	10/21/2009	fails	water bars	Y	Corrected angle of water bars	
Westside Roadside Hazard	roads	10/15/2009	meets			Can't blade road because conditions are too wet	
Tea Garden	roads/skid trails	5/19/2010	meets			Showers started at 10am. Operations stopped when water started to puddle. No haul	
Tea Garden	roads/skid trails	6/1/2010	meets	rutting	Y	Soil moisture good at 4" board line at 8". Some rutting on road and skid trail. Road and main skid trail was back bladed and drain outs built. All soil that moved stayed on main skid trail and road prism; it did not leave road or trail	
Tea Garden	roads/skid trails	6/8/2010	meets			Main skid trail and road repaired, back to original condition	
Trolly	skidding	4/26/2011	meets	rutting		Soil not dry to 4" depth. Operations terminated	
Mt Hebron	skidding	1/24/2011	meets	rutting		No operations- no snow and soil only frozen on top 1/2"	
Mt Hebron	skidding	2/22/2011	fails	rutting		Only 6" loose snow and ground not frozen	
Mt Hebron	skidding	4/4/2011	meets	rutting		No operations- WWOG and BMP conditions not met	soil scientist
Blacktail	roads/skid trails	1/18/2011	meets			Dry enough to harvest, no haul	
Blacktail	roads	1/20/2011	meets			Road dry enough to haul	
Blacktail	roads	2/22/2011	meets			Road plowed, 4" left on surface	

**Appendix B Cont'd. Non-Random BMP Monitoring of 2011 Timber Operations and Management of Roads during Wet Periods**

Project (timber sale)	Feature evaluated	Date	BMP status	BMP problem	Fix	Comment/ Corrective action	Resource person contacted
Orbit	skidding	4/21/2011	meets			soil wet to 4" depth, no operations	
Larch	roads/skid trails	1/13/2011	meets			Operations terminated due to rain and high temps	
Larch	skidding	1/24/2011	meets			Move to unit 7. Unit 12 is too wet	
Larch	skidding	2/22/2011	meets			Operations terminated , snow only 3-4" deep	
Miller	roads	11/17/2011	meets			Roads frozen or dry	
Miller	skidding	11/22/2011	meets			Snow over frozen ground	
Lookout Butte	roads/skid trails	11/29/2011	meets			Frozen patches, dry below 2"	
Mt Ashland	roads	11/20/2011	meets			No runoff, some ruts	
Mt Ashland	roads/skid trails	10/25/2011	meets			Skidding, harvesting, haul terminated due to rain and snow	
Mt Ashland	skidding	11/15/2011	meets			WWOG met, endlining OK	

### **Appendix C. Comparison of Evaluation Accomplishment with Target for KNF**

Evaluations were accomplished for a total of 60 sites, using 20 protocols to assess timber, engineering, recreation, grazing, and minerals management. The Klamath had a target of 58 sites using 26 protocols.

T01 – 4 of 4 were done.

T02 - 6 of 3 were done

T03 – 2 of 2 were done

T04 - 6 of 3 were done

T05 – 2 of 2 were done

T06 -0 of 1 were done.

T07 – 0 of 1 were done.

E08 – 4 of 3 were done.

E09 - 4 of 4 were done.

E10 – 4 of 4 were done.

E11 – 4 of the 3 were done.

E12 – 0 of 1 were done.

E13 – 2 of 2 were done.

E14 – 2 of 1 were done.

E16 – 2 of 2 were done.

E17 – 3 of 3 were done.

E19 – 0 of 1 were done.

E20 - 1 of 1 were done.

R22 – 1 of 1 were done.

R30 – 2 of 2 were done.

G24 – 4 of 4 were done.

F25 – 4 of 5 were done.

M26 – 1 of 1 were done.

**Appendix C Cont'd. Comparison of Evaluation Accomplishment with Target for KNF**

M27 – 0 of 1 were done.

V28 – 2 of 2 were done.

V29 – 0 of 1 were done.